
New Boraginaceae from Tropical America 3: A New *Tournefortia* from Ecuador and Colombia

James S. Miller

Missouri Botanical Garden, P.O. Box 299, St. Louis, Missouri 63166-0299, U.S.A.

ABSTRACT. *Tournefortia gigantifolia*, an unusual understory shrub, is described as new from wet forests in Ecuador and Colombia. It is distinct in its monocaulous or sparsely branched habit with large punctate leaves clustered near the stem apices. Its free anthers and unlobed fruits indicate clearly that it is a member of *Tournefortia* sect. *Tournefortia*, but its relationships with other species are not evident.

RESUMEN. *Tournefortia gigantifolia*, un arbusto excepcional de sotobosque, se describe como nueva especie. Habita en bosques húmedos en Ecuador y Colombia. Es distintivo en su forma de crecimiento monocaule o con pocas ramas, con hojas grandes que presentan abundantes puntos en el haz; las hojas están agrupadas cerca de los ápices de los tallos. Aunque esta nueva especie claramente pertenece al género *Tournefortia*, sección *Tournefortia*, sus parentesco con las otras especies de la sección no está claro.

The pantropical genus *Tournefortia* L. comprises at least 150 species that are strongly centered in the Neotropics. Most modern authors have treated the genus in a broad sense (Nowicke, 1969; Gibson, 1970; Nowicke & Skvarla, 1974) and have included species in three sections, although the nomenclature has been confused. Johnston (1930) recognized section *Cyphocyema* I. M. Johnston, a group of perhaps 20 species confined to the New World tropics, and section *Tournefortia* (as sect. *Eutournefortia*), which comprises the vast majority of the genus with well over 130 species. One species of section *Tournefortia* occurs in eastern Africa (Verdcourt, 1988), four are found in Madagascar and the Mascarenes, and eight range from southern Asia through the Philippines to Australia (Johnston, 1935b). The more than 100 species that occur in tropical America are mostly South American, and the majority of these species are found in the Andean countries. The third section, sect. *Mallatonia* Grisebach, consists of three species widely distributed in the Caribbean, Indian, and Pacific oceans. Johnston's opinion on the placement of these species varied widely through his publications on the

genus (Johnston, 1930, 1935a, b, 1949, 1951), and some authors have followed Britton (1915) in recognizing these species as generically distinct, but they have often been grouped together.

The genus has all but been ignored by modern monographers, and the last comprehensive treatment was that of De Candolle (1845). Since that time, the New World species have been treated only in floristic works and regional studies. The Central American species are comparatively well studied, having been treated for Veracruz (Nash & Moreno, 1981), Guatemala (Gibson, 1970), Nicaragua (Miller, in press), and Panama (Nowicke, 1969; Miller, 1988). Two studies of South American species of *Tournefortia* were published by Ivan Johnston that treated the species of Brazil, Paraguay, Uruguay, and Argentina (Johnston, 1930) and the Guianas and adjacent Brazil north of the Amazon (Johnston, 1935a).

Unfortunately, the Andean countries, certainly the center of diversity for the genus, have largely been ignored. E. P. Killip prepared, but never published (see Nowicke, 1974, for a more complete discussion of Killip's unpublished manuscripts), a treatment for the Andean countries, including Venezuela, Colombia, Ecuador, Peru, and Bolivia, and Killip's manuscript still exists in the archives of the National Herbarium at the Smithsonian Institution. While never submitted for publication, Killip's work did serve as the basis for two papers describing new species from the region (Killip, 1927, 1929). One more of the species recognized as new by Killip was later published by Nowicke (1974). Since Killip's effort there has been no comprehensive study of the Andean species, and new taxa from the northern Andean countries have been described individually (Johnston, 1956; Nowicke, 1974; Gentry, 1977; Gilli, 1983; Miller, 1989, 1995, 1997, 2000). While Killip's short papers published most of the new taxa that he recognized, several were never validly published; their use has nevertheless crept into herbaria from specimens that Killip annotated. One of these is for a plant from wet forests of northern Ecuador and adjacent Colombia that has never been described despite

having been collected repeatedly. The following description, and association with a modern type, validates the name that Killip intended to use.

Tournefortia gigantifolia Killip ex J. S. Miller, sp. nov. TYPE: Ecuador. Napo: Reserva Biológica Jatún Sacha, ca. 8 km ESE of Puerto Misahualli, primary forest along the Misahualí-Coca road, elev. 450 m, 1°4'S, 77°37'W, 3 July 1986, James S. Miller, W. Wilbert & S. F. S. Medical Botany Class 2321 (holotype, MO 3896675; isotypes, QCA, US). Figure 1.

Frutex usque ad 1.5(–3) m altus, ramulis glabris vel sparse puberulentis ad grosse tomentosis. Folia alterna; lamina oblanceolata ad lanceolata, (22–)30–50(–60) cm longa, (7–)9–13(–16) cm lata, apice acuminata ad attenuata vel acuta, basi attenuata vel decurrenti, supra glabra et dense punctata, infra glabra vel minute strigillosa; petiolo 0.5–1(–4) cm longo, glabro ad grosse tomentoso. Inflorescentia internodalis, pedunculo (6–)8–20(–24) cm longo. Flores sessiles vel in pedunculis brevibus ad 1.5(–3) mm longis, seorsum 0.5–2 mm dispositis, bisexualis; sepalum lanceolatum, 3–5 mm longum; corolla alba ad viridis, tubularis, 6–13 mm longis.

Unbranched or sparsely branched shrub to 1.5(–3) m tall, the stems glabrous or sparsely puberulent to coarsely tomentose, the hairs brown, thick, flattened, contorted, and uneven. Leaves alternate, clustered near the stem apex; leaf blade oblanceolate to lanceolate, (22–)30–50(–60) cm long, (7–)9–13(–16) cm wide, the apex acuminate to attenuate or acute, the base attenuate or decurrent, the margin entire, sometimes irregularly undulate, usually minutely revolute, the adaxial surface glabrous, often densely and evenly punctate, the abaxial surface glabrous or minutely strigillose with the hairs mostly near and parallel to the secondary veins, the venation brochidodromous, the midrib evident above and usually even with the surface, prominent and raised below, glabrous to strigillose, sometimes with the coarse tomentum of the stems and petioles extending onto the lower part of the midrib, the secondary veins 7 to 13 (to 20), obscure near the margin on the upper surface, evident and raised below, connecting with the adjacent veins in a series of arched secondary loops; petioles stout, 0.5–1(–4) cm long or nearly absent and the leaves ± sessile, glabrous to coarsely tomentose, the hairs like those of the stems. Inflorescences borne among the leaves, internodal but often borne just above the leaf axils and appearing nearly axillary, cymose and variable in form, the 4 to 13 helicoid branches usually arising at or near the same point, or the peduncle branching once or twice before the ultimate branching, the peduncle (6–)8–20(–24) cm long, coarsely tomentose to puberulent, often some-

what fasciated at the point where the ultimate branches arise, the flowers 0.5–2 mm apart, nearly sessile or on short pedicels 1.5(–3) mm long. Flowers bisexual; sepals lanceolate, 3–5 mm long, 0.7–1.5 mm wide, glabrous or with a few minute hairs near the margins, the midrib very prominent; corolla white to green, tubular, 6–13 mm long, the 5 lobes short, parallel-sided and truncate as corollas open but spreading to widely ovate and rounded at mid-anthesis, 1–1.5 mm long, 0.8–2 mm wide, glabrous; stamens 5, the filaments 3.5–5 mm long, completely adnate to the corolla tube, the anthers ellipsoid, 0.6–1 mm long, borne just above the stigma; ovary not distinct from the style, ca. 1 mm long, ca. 1 mm wide, the style 2.5–6.5 mm long, the stigma conical with the sterile portion extending ca. 0.5 mm beyond the prominent annular receptive portion. Fruits white, drupaceous, broadly ovoid, 4–5.5 mm long, 5–6 mm wide, glabrous, the four pyrenes minutely rugulose on the exterior surface.

Tournefortia gigantifolia occurs as an understory shrub in wet forests from 450 to 1800 m in southwestern Colombia and northern and eastern Ecuador.

Tournefortia gigantifolia is a distinctive species, and its relationships within section *Tournefortia* are not apparent. It is easily recognized by its monocaulous growth habit with large, often nearly sessile, punctate leaves clustered near the stem apex, its long pedunculate inflorescences, and its long tubular greenish white corollas. It superficially resembles *Tournefortia longifolia* Ruiz & Pavón of Peru, but that species differs in having smaller leaves, less than 15 cm long, that are more widely spaced on the stems. It might also be confused with *T. foetidissima* L., which differs in having linear-lanceolate corolla lobes that are acute at the apex and a style that is shorter than the stigma. Both of these species also lack the punctations on the leaves that are characteristic of *T. gigantifolia*.

Additional specimens examined. COLOMBIA. Chocó: Carretera Istmina–Quibdó, entre El Dos y Las Animas, 5°15–18'N, 76°38–40'W, Forero et al. 5471 (MO). Nariño: Reserva Natural La Planada, a 7 km de Chucunés, elev. 1800 m, 1°10'N, 77°58'W, Benavides 8801 (MO); Reserva La Planada, Quebradas, El Mar–La Calladita, elev. 1500–1800 m, 1°10'N, 77°58'W, Benavides 9611 (MO); La Planada, S of Ricaurte, 7 km from Tumaco–Pasto road, cloud forest, elev. 1800 m, 1°10'N, 77°58'W, Gentry et al. 55123a (MO); Junín–Barbacoas road, 2–10 km N of Junín, pluvial forest, elev. 900–1000 m, 1°30'N, 78°10'W, Gentry et al. 55294 (MO); La Planada Reserve, 7 km from Chucunés, cloud forest, 1°05'N, 78°01'W, Gentry et al. 60532 (MO); trail from La Planada to Pielapi, wet lower montane cloud forest, elev. 1600–1800 m, 1°04'N, 78°02'W, Gentry et al. 63590 (MO); Reserva Natural La Planada, municipio de Ricaurte, elev. 1800 m, Restrepo




Figure 1. *Tournefortia gigantifolia* Killip ex J. S. Miller. —A. Flowering branch. —B. Portion of inflorescence with two open flowers. —C. Flower with front sepal removed and corolla longitudinally sectioned to show relation of gynoecium to anthers. —D. Portion of infructescence with two fruits. —E. Adaxial surface of pyrene with exocarp removed (all from Cerón 6058, MO).

516 (MO). **Putumayo:** San José, Río Putumayo, *Sprague* 612 (US). ECUADOR. **Carchi:** Maldonado, Parroquia Tobar Donoso, Reserva Etnica Awá, Sabalera, bosque húmedo tropical, elev. 900 m, 00°55'N, 78°32'W, *Aulestia et al.* 792 (MO); SE trail, primary forest in Gualpi Chicó area of Awá Reserve, near encampment, 1330 m, 0°58'N, 78°16'W, *Hoover et al.* 2796 (MO); Tulcán Cantón, Parroquia Chical, Sector Gualpi medio, Reserva Indígena Awá, Sendero a San Marcos al norte de la casa comunal, bosque muy húmedo premontano, 01°02'N, 78°16'W, *Tipaz et al.* 1117 (MO); Tulcán Cantón, Parroquia Tobar Donoso, sector Sabalera, Reserva Indígena Awá, Bosque primario Noreste Casa Comunal, bosque muy húmedo premontano, elev. 650–1000 m, 01°00'N, 78°24'W, *Tipaz et al.* 1496 (MO); Tulcán Cantón, Parroquia Tobar Donoso, Reserva Indígena Awá, Centro El Baboso, bosque muy húmedo premontano, elev. 1800 m, 00°53'N, 78°25'W, *Tipaz et al.* 1918 (MO); Lita, wet evergreen forest, elev. 600 m, *van der Werff* 9541 (MO). **Cotopaxi:** Tenefuerte, Río Pilalo, Km 52–53, Quevedo, Latacunga, elev. 750–1300 m, *Dodson & Gentry* 12818 (MO); Tenefuerte, Km 55 Quevedo–Latacunga, elev. 850–1000 m, *Dodson et al.* 14421 (MO). **Esmeraldas:** new road under construction from Lita to San Lorenzo, 600–800 m, 00°58'N, 78°35'W, *Gentry et al.* 69957 (MO); road between Lita, Alto Tambo and beyond, 2500 ft., *Kress et al.* 88–2304 (US); Cantón Eloy Alfaro, Comuna de Calle Mansa (Río Grande, afluente del Cayapas), elev. 130–180 m, 00°44'N, 78°53'W, *Váñez et al.* 1474 (MO). **Morona-Santiago:** Pozo petrolero "Garza" de TENNECO, 35 km al noreste de Montalvo, bosque húmedo tropical, elev. 260 m, 01°49'S, 76°42'W, *Zak & Espinoza* 4695 (MO). **Napo:** Reserva Biológica Jatún Sacha, Río Napo, 8 km al E de Misahualli, bosque muy húmedo tropical, elev. 450 m, 01°04'S, 77°36'W, *Cerón* 1055 (MO); Reserva Biológica Jatún Sacha, bosque muy húmedo tropical, 450 m, 01°04'S, 77°36'W, *Cerón & Cerón* 4684 (MO); Cantón Tena, Estación Biológica Jatún Sacha, 8 km al este de Misahualli, bosque muy húmedo tropical, 400 m, 1°04'S, 77°36'W, *Cerón* 6058 (MO); along road between Baeza and Lago Agria, 72.5 km W of Lago Agria, elev. 1166 m, *Croat* 49526 (MO); Cantón Archidona, area al sureste del Volcán Sumaco, carretera Hollín–Loreto, Km 65, Huaticocha, bosque muy húmedo tropical, elev. 620 m, 00°45'S, 77°28'W, *Hurtado* 2334 (MO); margen derecho del Río Napo, 8 km de Puerto Misahualli, bosque muy húmedo tropical, elev. 450 m, 01°04'S, 77°37'W, *Palacios* 2967 (MO); 8 km río abajo de Puerto Misahualli, por el Río Napo, elev. 450 m, 1°04'S, 77°36'W, *Zaruma et al.* 261 (MO). **Pastaza:** Pastaza Cantón, Pozo Petrolero "Corrientes" de UNOCAL, bosque húmedo tropical, elev. 300 m, 01°43'S, 76°49'W, *Gudiño* 665 (MO); Pastaza Cantón, Pozo Petrolero Villano 2, bosque húmedo tropical, elev. 350 m, 01°29'S, 77°27'W, *Palacios* 10254 (US). **Pichincha:** Centinela, Cantón Santo Domingo, 12 km E of Patricia Pilar, elev. 600 m, *Dodson & Embree* 7208 (MO); path following ridge line at El Centinela at crest of Montañas de Ila road from Patricia Pilar to 24 de Mayo at Km 12 (Patricia Pilar is at Km 45 on road from Santo Domingo to Quevedo), elev. 600 m, *Dodson & Duke* 7650 (MO), *Dodson et al.* 8675 (MO); Centinela, 12 km al este de Patricia Pilar en el Km 47 Santo Domingo a Quevedo, elev. 650 m, *Dodson et al.* 14773 (MO); elev. 600 m, *Dodson & Neill* 15535 (MO); Reserva Florística-Ecológica "Río Guajalito," Km 59 de la carretera antigua Quito–Santo Domingo de los Colorados, 3.5 km al NE de la carretera, elev. 1800–2200 m, 0°13'53"S, 78°48'10"W.

Jaramillo & Zak 8013 (MO); Reserva Florística-Ecológica "Río Guajalito," Km 59 de la carretera antigua Quito–Santo Domingo, bosque muy húmedo montano bajo, elev. 1800–2200 m, 0°13'S, 78°48'W, *Zak & Jaramillo* 3734 (MO).

Acknowledgments. I thank Kim Martin for the illustration, the Smithsonian Institution, particularly Joan Nowicke, for making Killip's unpublished manuscript available, and Philip Silverstone-Sopkin for review comments.

Literature Cited

- Britton, N. L. 1915. The vegetation of Mona Island. Ann. Missouri Bot. Gard. 2: 33–57.
- Candolle, A. P. De. 1845. Boraginaceae. In: Prodr. 9: 466–501.
- Gentry, A. H. 1977. New species of *Gibsoniothamnus* (Serophulariaceae/Bignoniaceae) and *Tournefortia* (Boraginaceae) from eastern Panama and the Chocó. Ann. Missouri Bot. Gard. 64: 133–135.
- Gibson, D. N. 1970. Boraginaceae. In: Flora of Guatemala. Fieldiana, Bot. 24: 111–167.
- Gilli, A. 1983. Beiträge zur Flora von Ecuador 3. Sympetalae. Feddes Repert. 94: 303–322.
- Johnston, I. M. 1930. Studies in the Boraginaceae 8. 1. Observations on the species of *Cordia* and *Tournefortia* known from Brazil, Paraguay, Uruguay, and Argentina. Contr. Gray Herb. 92: 3–89.
- . 1935a. Studies in the Boraginaceae 10. The Boraginaceae of northeastern South America. J. Arnold Arbor. 16: 1–64.
- . 1935b. Studies in the Boraginaceae 11. (1) The species of *Tournefortia* and *Messerschmidia* in the Old World. (2) Notes on Brand's treatment of *Cryptantha*. (3) New or otherwise noteworthy species. J. Arnold Arbor. 16: 145–205.
- . 1949. Studies in the Boraginaceae 18. Boraginaceae of the southern West Indies. J. Arnold Arbor. 30: 111–138.
- . 1951. Studies in the Boraginaceae 20. Representatives of three subfamilies in eastern Asia. J. Arnold Arbor. 32: 1–26 and 99–122.
- . 1956. Studies in the Boraginaceae 28. New or otherwise interesting species from America and Asia. J. Arnold Arbor. 37: 288–306.
- Killip, E. P. 1927. New species of *Cordia* and *Tournefortia* from northwestern South America. J. Washington Acad. Sci. 17: 327–335.
- . 1929. New plants mainly from western South America—II. J. Washington Acad. Sci. 19: 191–195.
- Miller, J. S. 1988. A revised treatment of Boraginaceae for Panama. Ann. Missouri Bot. Gard. 75: 456–521.
- . 1989. Two new species of *Tournefortia* (Boraginaceae) from Colombia. Ann. Missouri Bot. Gard. 76: 619–622.
- . 1995. A new species of *Tournefortia* from La Planada, Colombia. Novon 5: 188–189.
- . 1997. A new species of *Tournefortia* (Boraginaceae) from Peru. Novon 7: 265–267.
- . 2000. New Boraginaceae from tropical America 2: *Tournefortia rasquezii*, a new species from Peru. Novon 10: 45–47.
- . In press. Boraginaceae. In: W. D. Stevens et al. (editors), Flora de Nicaragua. Monogr. Syst. Bot. Mis-

- souri Bot. Gard.
- Nash, D. L. & N. P. Moreno. 1981. Boraginaceae. In: Flora de Veracruz, Fasciculo 18: 1–149.
- Nowicke, J. W. 1969. Boraginaceae. In: Flora of Panama. Ann. Missouri Bot. Gard. 56: 33–69.
- . 1974. Three new species of *Tournefortia* (Boraginaceae) from the Andes and comments on the manuscrips of E. P. Killip. Bull. Torrey Bot. Club 101: 229–234.
- & J. J. Skvarla. 1974. A palynological investigation of the genus *Tournefortia* (Boraginaceae). Amer. J. Bot. 61: 1021–1036.
- Verdcourt, B. 1988. A new combination in *Tournefortia* (Boraginaceae). Kew Bull. 43: 436.